ORIGINAL

EX PARTE OR LATE FILED

RECEIVED

NOV 16 2001

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

ORIGINAL

wrf

Wiley Rein & Fielding LLP

1776 K STREET NW
WASHINGTON, DC 20006
PHONE 202.719.7000
FAX 202.719.7049

Virginia Office
7925 JONES BRANCH DRIVE
SUITE 6200
McLEAN, VA 22102
PHONE 703.905.2800
FAX 703.905.2820

www.wrf.com

November 16, 2001

Robert L. Pettit
202.719.7019
rpettit@wrf.com

Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: *Ex Parte* Notification in ET Docket No. 98-153

Dear Ms. Salas:

On November 15, 2001, Jeff Ross and William Webb of Time Domain Corporation and the undersigned met with Peter Tenhula of Chairman Powell's office to discuss the above-captioned proceeding. The substance of our discussions are reflected in the attached documents.

In accordance with the Commission's rules, an original and one copy of this notification are being filed. If you have any questions or would like anything further, please let me know.

Sincerely,

Robert L. Pettit
Counsel for Time Domain Corporation

Enclosures

cc: Peter Tenhula, Esquire

No. of Copies rec'd 0+1
List ABCDE

TIME DOMAIN
THE PULSE OF THE FUTURE

Time Domain Corporation
1666 K Street, N. W.
Suite 250
Washington, D.C. 20006

November 14, 2001

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, S.W. TW-A325
Washington, DC 20554

Re: *Ex Parte* Notification and Summary, Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, ET Docket No. 98-153

Dear Ms. Salas:

On November 14, 2001, Mimi Dawson and the undersigned met with Bryan Tramont, Senior Legal Advisor to Commissioner Abernathy. We discussed the status of the Commission's rulemaking on Ultra Wideband. The extensive record in this proceeding, including several testing efforts, demonstrates that UWB can operate as set forth in the Commission's Notice of Proposed Rulemaking (NPRM) without causing harmful interference to existing radio services. As a practical matter, we recognize that the Commission may find it necessary to proceed with a first report and order adopting rules for UWB that are more constraining than the proposal set forth in the NPRM.

We discussed potential areas of compromise for a UWB rulemaking that might include:

- **Indoor Operation.** Permit indoor operation of UWB according to the emissions mask set forth by the FCC in its NPRM. Limiting UWB to indoor operation would provide an additional 9 to 12 db attention of UWB signals below the level set forth in the NPRM. Government and commercial systems that claim there is a potential for harmful interference from UWB generally operate outdoors.

- **Peer-to-Peer Communications.** In order to address concerns raised by the aviation and GPS industries with regard to proliferation of mobile communications devices outdoors, the FCC has raised the possibility of a prohibition on the operation of peer-to-peer communications devices. If the Commission adopts such a prohibition, it should permit two-way communications only where at least one device that is communicating is AC powered.

www.timedomain.com
1.202.835.3001 phone
1.202.835.3008 fax

TIME DOMAIN
THE PULSE OF THE FUTURE

Time Domain Corporation
1666 K Street, N. W.
Suite 250
Washington, D.C. 20006

- **Outdoor, Fixed, On-Premises Operation.** Permit outdoor tracking and radar below 6 GHz for eligible industrial and commercial entities only at the power levels proposed by the FCC in its NPRM. The eligibility limit is designed to reduce the number of potential users. The constraint on applications is designed to reduce the interference potential. Outdoor radar is primarily for fixed, safety devices such as radar and security fences and domes. Outdoor tracking for is low-duty cycle, fixed, non-mobile, on-premises use, such as employee safety tracking. Permit operation of UWB above 6 GHz at power levels set forth in the NPRM. Government and commercial systems claiming harmful interference are located below 6GHz. Even government and commercial critics of UWB have not raised concerns about operation of UWB above 6 GHz.

- **Public Safety/ Law Enforcement/ Homeland Security Applications.** Permit operation of UWB devices by eligible individuals at full Part 15 class B power for indoor and outdoor use. Eligibility would be limited to entities eligible for assignment of frequencies from the Part 90 public safety pool of frequencies. The types of applications that would be covered by public safety/law enforcement rules:

    - Through-wall motion detection devices
    - Active location tags worn by public safety or law enforcement personnel.

    These applications save lives. There would only be a limited number of devices deployed for short periods of time for use in emergency situations and training. Only trained public safety personnel would operate the devices. Full Part 15 Class B power is the same power level as the FCC waiver granted in 1999 for public safety applications. UWB radar applications devices place energy into the ground or walls.

Pursuant to Section 1.1206 of the Commission's Rules, 47 C.F.R. §1.1206, an original and a copy of this letter have been submitted for inclusion in the public record. Please contact me at the phone number listed above if you have any questions concerning this letter.

Sincerely,

Jeffrey L. Ross
Vice President, Corporate Development and Strategy
Time Domain Corporation

www.timedomain.com
1.202.835.3001 phone
1.202.835.3008 fax

Exceptional UWB Applications

Crisis Prevention / Military Enhancement

Through-Wall Radar (RadarVision)
A high resolution UWB radar imaging system that will provide critical real-time intelligence to law enforcement and search and rescue teams.

- Penetrates common building materials (reinforced concrete, concrete block, sheetrock, brick, wood, plaster, tile, fiberglass).
- Provides visual "map" of detected motion
- Prototypes are already field-tested

Secure Tactical Short-Range Radio
A secure UWB radio that will deliver reliable, robust operation communications in urban terrain and other complex environments.

- Advanced LPI/LPD/AJ waveform
- Inherent "built–in" ranging information
- Functions robustly in complex urban environments
- Interoperable with existing networks
- Digital design with available commercial chips

Self-Configuring Bi-Static Radar Security Fence
A UWB radar security fence that will provide an "invisible" barrier to intruders or around high value assets.

- Can work in conjunction with a passive tag (below)
  - Provides access control
  - Distinguishes authorized personnel from intruders
- Integrated communications
  - Communicates status to a command post
- LPI/LPD for stealthy deployment
- Interoperable with existing networks

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

Consequence Management

UWB Beacon for Flight Recorders
A UWB transmitting beacon integrated into flight recorders to assist and expedite crucial post-crash hardware recovery.

- Allows precision 3D location of flight recorders
- Low RF frequency allows obstacle penetration (e.g. debris, dirt)
- Transmit only or transmit after receive architecture
- Battery-powered

Passive Tracking Tag to Track/Locate First Responders and Service members
A small, inexpensive tag to aid rescue operations and help prevent security breaches.

- Augments RadarVision and RubbleVision rescue capability
- With use of hand-held radar, will provide location (range and direction) of anyone with a tag on their person
- Battery-power provides long life

Active Tracking Tag to Track with Sensor Input/Information Transfer
A UWB tag that will provide a one-way, transmit-only tracking mechanism for increased security at the scene of emergencies.

- Precision 3-D tracking tag
- Transmit-only architecture with individual ID
- Self-calibrating infrastructure
- Ideal for use in permanent or temporary situations
- Battery-powered, small form factor

Multi-Sensors for Robots (high data rate video, chemical/biological, range, through-wall, motion detection)
A UWB-enabled robot that will provide a vital resource in disaster recovery and hostage rescue situations and for reconnaissance in dangerous situations.

- Wireless command and control of remotes devices
- LPI/LPD/AJ waveform
- High data rate enables multiple sensors (environmental, video/audio)
- Accurate 3-D tracking for closed loop control
- Radar capability for sensing functions

Through-Rubble Radar (RubbleVision)
A UWB radar device targeted for use by urban search and rescue teams to locate life in disaster situations.

- Movement detection through 15 feet of concrete/building materials
- Detection of extremely small movements
- Precise resolution

CRISIS PREVENTION • CONSEQUENCE MANAGEMENT

RadarVision®

Concept

Time Domain's RadarVision® 2000 (RV2000) is a high-resolution radar imaging system powered by ultra wideband (UWB) technology. RadarVision can penetrate most common building materials and provides a new capability in threat detection. Applications of RadarVision include hostage rescue situations, monitoring soldiers on the battlefield, and next generation security systems.

Likely Users

RV2000 radar units provide through-wall intelligence vital to law enforcement and search and rescue teams. Time Domain's RadarVision units have been demonstrated to the military, law enforcement, and many fire and rescue squads. Law enforcement partners are scheduled to evaluate RV2000 prototypes. It is anticipated that final RV2000 units will be available for delivery to U.S. law enforcement offices in July, 2002.

Capabilities

The RV2000's signal penetrates common building materials such as reinforced concrete, concrete block, sheetrock, brick, wood, plaster, tile and fiberglass. In common with all RF technologies, the signal cannot penetrate solid metal or metal-coated objects.
A "map" of detected motion is displayed onboard the RadarVision2000 unit, providing the operator with real-time intelligence on the direction and distance to the motion contact. Applications include:

- **Tactical Operations** - providing knowledge of where people are- before law enforcement officers enter a building- and potentially preventing death and injury
- **Search Operations** - revealing where suspects are hiding- in attics, warehouses, basements, outbuildings, tunnels and sewers.
- **Patrol Force Multiplier** - expanding security sectors when a single patrol officer must secure an area by guarding multiple entrances and exits

The U.S. military will adapt RadarVision technology to develop SoldierVision™ , an advanced through-wall surveillance radar specifically adapted for military use.

Future Development Plan

RadarVision2000 is undergoing final testing and evaluation and is anticipated to be available in July, 2002.

Time Domain Corporation

Time Domain Corporation, a worldwide leader in the development of Ultra Wideband technology, has developed and patented the potentially breakthrough wireless technology called PulsON. This technology fuses communications, radar and tracking capabilities into a PulsON chipset that delivers significant capabilities for a wide range of products and applications.

V2-09/27/01

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

CRISIS PREVENTION • CONSEQUENCE MANAGEMENT

Secure Tactical UWB Radio

Concept

Operations in urban settings demand very close coordination among the team members. Communications must be reliable, the radios must be simple to use, rugged, lightweight and have long battery life. These devices must not make their users a target because of their RF signature. Urban teams usually remain in close proximity because line-of-sight (LOS) visibility is so restricted.

Time Domain can develop a squad level man-pack voice radio implementing Ultra Wideband (UWB) technology. This secure tactical UWB radio will deliver robust operation communications in urban terrain. Its utility will support all phases and intensity of team activity: training, rehearsal, planning and operational missions. These radios will be used in both Prevention & Consequence Management circumstances, as they are not dependent upon an installed infrastructure.

Likely Users

The secure radio is intended for combat teams of up to 12 operators, where every member is so equipped. Voice modes are push-to-talk and broadcast modes. Public safety, law enforcement, firefighters, search & rescue, intelligence and security teams will likely be consumers of variants of these radios.

Capabilities

An urban radio having LPI/LPD/AJ features will be most valuable in special operations missions and against sophisticated threats capable of employing direction-finding techniques. The secure radio is especially devised for use in urban terrain where multipath & absorption conditions are most difficult for traditional man pack radios to overcome. With a range up to one (1) mile in optimal open terrain for voice communications, the secure radio will also provide acceptable range of up to 300 meters in urban settings.
Additionally, situational awareness feature in the form of link range information is a special benefit of secure radio. Digital file transfer (in a standard format) and provision of a serial port for data input are highly desirable capabilities to include. Battery powered, it will perform acquisition while in motion, up to 100 kilometers per hour total differential speed.

Future Development Plan

Time Domain's PulsON Application Demonstrators (PADs) can provide the basis for a demonstration of the secure UWB radio. Further development will be needed to establish a good voice channel and "untethering" the PAD for mobile use, requiring a battery pack and perhaps a backpack frame.

Time Domain Corporation

Time Domain Corporation, a worldwide leader in the development of Ultra Wideband technology, has developed and patented the potentially breakthrough wireless technology called PulsON. This technology fuses communications, radar and tracking capabilities into a PulsON chipset that delivers significant capabilities for a wide range of products and applications.

V2-09/27/01

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

Radar Fence

Concept

Time Domain's ultra wideband (UWB) radar security fence could provide an "invisible" barrier around high value assets. This security fence could cause intruders to trigger either audible or silent alarms to authorities.

Likely Users

Expected users of the radar security fence are the Military for adaptable and scalable solutions for force protection in highly mobile operations, and the commercial aviation industry for protection of airplanes on the tarmac at night, alerting surveillance personnel to intruders.

Capabilities

The Security Fence offers the following features:

- Invisible zones of security for fixed & mobile assets
- Variable size, shape (antenna) and configuration (self-configuring)
- Low power, low RF signature: LPI/LPD
- Multiple/variable alarms types
- Wall penetration capability
- Low data rate communications to 'show' exactly where the security breach point was and when it occurred.

If an intruder passed through the fence, an alarm would be transmitted through the communications channel back to a central node monitored by the user. The information would display that there had been a security break and it would inform them of where it had occurred so that appropriate action could be taken.

Future Development Plan

Future development includes adding battery powered capability to the security fence. Longer-term development focus would add a tag function such that if a 'friendly' with an appropriate badge enters the area there is no alarm -- but if an inappropriate badge or non-badged person enters the area, an alarm sounds (or is registered).

Time Domain Corporation

Time Domain Corporation, a worldwide leader in the development of Ultra Wideband technology, has developed and patented the potentially breakthrough wireless technology called PulsON. This technology fuses communications, radar and tracking capabilities into a PulsON chipset that delivers significant capabilities for a wide range of products and applications.

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

CRISIS PREVENTION • CONSEQUENCE MANAGEMENT

UWB Beacon for Flight Recorders

Concept

At the scene of any aircraft crash, one of the most crucial tasks is the recovery of the plane's flight data recorder and cockpit voice recorder (commonly known as Black Boxes). An ultra wideband (UWB) transmitting beacon integrated into the Black Boxes could enable the obscured boxes to become visible to the right equipment.

A UWB beacon transmitter would be embedded in the Black Box flight recorders in aircraft to enable quick location of the recorders by UWB direction finding, time-of-arrival, and ranging equipment.

Likely Users

National Transportation Safety Board (NTSB) personnel with appropriate receiver equipment would benefit from this technology. NTSB teams would use portable UWB receivers or transmitters, which can use any of several UWB radiolocation means to operate with UWB receivers that the NTSB would set up at the crash site.

Capabilities

The UWB radios embedded into the Black Boxes would be activated after a crash or other incident, and have the following features:

- Provide a tracking beacon for the Black Boxes
- Use a low-frequency, high-power pulser
- Battery-powered with a minimum one-week battery life
- Use a one way transmit-only or, alternatively, receive after transmit capability

Future Development Plan

New development work will be required to create a new RF design for a high power pulser. A new mechanical design will need to be developed for the UWB tracking beacon. Additionally, the UWB receivers will need to be ruggedized to withstand crash impact. Signal propagation issues will also need to be studied.

Time Domain will need to coordinate with the NTSB to verify performance of the UWB Beacons in suggested test scenarios.

Time Domain Corporation

Time Domain Corporation, a worldwide leader in the development of Ultra Wideband technology, has developed and patented the potentially breakthrough wireless technology called PulsON. This technology fuses communications, radar and tracking capabilities into a PulsON chipset that delivers significant capabilities for a wide range of products and applications.

V2-09/27/01

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

Passive Tracking Tag

Concept

Through the use of ultra wideband technology (UWB), passive tracking tags can be used to rescue survivors in the rubble of natural disasters like earthquakes, floods and avalanches. In addition to potentially accelerating location and rescue, tags can make public areas safer through increased security.
These tags would operate without RF circuitry and will respond only if directly interrogated by a RubbleVision™ or RadarVision® system. Passive tracking tags will function on roughly the same battery power as a digital watch; will store a small amount of data; will be inexpensive and small; and will not radiate until interrogated. The tags will not interfere with other communications devices.
Time Domain proposes two types of tag: Survivor tag and an Identification tag. The Survivor tag can be used to locate people or objects in the aftermath of earthquakes, bombings, avalanches, etc. The Identification tag additionally contains an ID code enabling such applications as access control to restricted areas.
The system may also include a process to prevent theft of tags by requiring that tags are "re-authorized" after they are removed from clothing.

Likely Users

There are many potential users for the passive tracking tag. Tags could be issued to airline passengers and crew, high-rise office and apartment dwellers, and employees and visitors of high security installations such as nuclear power plants and electrical switching stations.

Capabilities

Both the Survivor and the Identification tags have three levels of operation for increasing the capabilities of the tags.

- *Level One - (Survivor tag)*
  These tags will announce their presence to the RadarVision unit. While not capable of revealing what or who has been found, they will be able to confirm the existence and precise location of a tagged object.
- *Level Two - (ID tag)*
  This version of the tag will incorporate some data (name, social security number, serial code) into the modulation to identify whom or what has been found. This additional function enables the tag to serve a preventative or safety role by permitting or denying access to secured areas.
- *Level Three - (Advanced ID tag)*
  A truly advanced tag, this version would use a biosensor to let rescuers locate survivors and identify those in greatest distress. Future versions of the tag might include thermal, nuclear, biological or chemical sensors used to evaluate the distressed individual or the environment surrounding a person or asset.

Future Development

Primary implementation issues include determining the interrogator network required to track a large number of tags in a specified space, defining distance and location with sufficient resolution to find people or assets, and ensuring that individuals use the tags properly and that security personnel or computers correctly monitor the network. Major steps and milestones include creating a functioning prototype of a Level One tag, ensuring a functioning link between the tag and RadarVision. Additional funding will be needed to evaluate the network requirements and to develop more sophisticated versions of the tags as described in Level Two and Level Three.

Time Domain Corporation

Time Domain Corporation, a worldwide leader in the development of Ultra Wideband technology, has developed and patented the potentially breakthrough wireless technology called PulsON. This technology fuses communications, radar and tracking capabilities into a PulsON chipset that delivers significant capabilities for a wide range of products and applications.

V2-09/27/01

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

Active Tag

Concept

The ultra wideband (UWB) active tracking tag can provide a one way, transmit only tracking tag for increased security at the scene of emergencies. These tags will provide individual identification when emergency personnel or others must be identified for authorized access. Active tracking tags can also provide location tracking of personnel and key equipment.

Likely Users

The active tracking tag will provide added security to emergency personnel, and can also be issued to others on the scene of an emergency such as reporters, survivors, and witnesses.

These tags can be also issued for temporary use in situations of increased security, or as temporary passes in sensitive areas after access authorization has been approved. Active tracking tags can also be applied on the scene to selected items to ensure that their location is known.

Capabilities

On the scene of an emergency or where increased security is required, a network of radios would be deployed to establish a fixed reference network of receivers for the active tracking tags. The network self-calibrates and a central network controller can display and log the location of tags relative to the deployed network. The system allows continuous location of the tracking tags, rather than simply being read at portals. The self-calibrating nature of the network makes this system ideal for deployment in temporary situations.

Active tracking tags provide sensor input and information storage. The tags have a variable transmit rate depending on motion or other sensor alarm conditions. The battery power of the active tracking tag is not activated until the tag is ready for deployment.

Future Development

Time Domain will develop a prototype of the active tracking tag for testing and evaluation. Additional efforts will be devoted to reducing the size and weight of the tag to minimize the impact on personnel.

Time Domain Corporation

Time Domain Corporation, a worldwide leader in the development of Ultra Wideband technology, has developed and patented the potentially breakthrough wireless technology called PulsON. This technology fuses communications, radar and tracking capabilities into a PulsON chipset that delivers significant capabilities for a wide range of products and applications.

V2-09/27/01

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

UWB Robot

Concept

An ultra wideband (UWB) enabled robot can provide a vital resource in both disaster recovery and hostage rescue situations. This robot could be used in environments that are dangerous to humans, or where covert situational awareness is required.

In disaster situations, a robot carrying lights, cameras, or even oxygen and water supplies, could be sent in to look for survivors. The underground nature of the task, with a high multipath environment, is not an obstacle for UWB waveforms and transmissions

In a hostage rescue, a robot could get closer to the situation without endangering human lives. Using UWB radar, it could map out a picture of the environment, people, and location; and wirelessly transmit that information to rescue personnel. The robot could also be used to deliver incapacitating elements, such as gas or smoke or even concussion devices.

Likely Users

Search and rescue teams, law enforcement, and military units.

Capabilities

Employing the ultra wideband advantages of wireless links, high definition radar sensing and precision tracking, can enhance the capabilities of existing robotics. Some of the advantages of a UWB enabled robot are:

- Covert and jam resistant transmissions
- High data rate transmissions supporting multiple sensors
- Wireless operation with no cables to become snagged or damaged
- Precision positioning capability to guide and locate the robot and also map the building.
- UWB radar capability can be fused into the robot to enable sensing and target acquisition.

Future Development Plan

Ultra wideband technology would be integrated into existing robotic technology to create a prototype for demonstration and evaluation. A successful prototype would demonstrate how the wireless communication links, radar, and positioning features of ultra wideband technology would enhance robotic technology.

Time Domain Corporation

Time Domain Corporation, a worldwide leader in the development of Ultra Wideband technology, has developed and patented the potentially breakthrough wireless technology called PulsON. This technology fuses communications, radar and tracking capabilities into a PulsON chipset that delivers significant capabilities for a wide range of products and applications.

V2-09/27/01

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

CRISIS PREVENTION · CONSEQUENCE MANAGEMENT

RubbleVision™

Concept

There is a real need to develop a deployable device that puts new technology in the hands of the urban search and rescue (SAR) teams. The intent is not to replace existing tools, but to find new approaches that complement and augment them.
Time Domain has developed an Ultra Wideband (UWB) radar that uses millions of pulses per second to penetrate most common building materials. For law enforcement, this radar is named RadarVision® . A variant called SoldierVision™ is being developed for the military under a U.S. Army contract. Time Domain has already tested applications of its UWB radar in urban search and rescue scenarios using RadarVision developmental prototypes. This SAR variant is referred to as RubbleVision .

Likely Users

RubbleVision is intended as a tool for urban search and rescue (SAR) teams.

Capabilities

Time Domain has tested the wall/rubble penetration of its radar technology both in its own facilities and in sessions on realistic "rubble piles" used for training by urban search and rescue teams.
Under laboratory conditions prototype hardware has demonstrated the ability to detect the motion of a person, through seven walls including rebar and wire mesh constructions.
UWB radar has several advantages for detecting human presence.

- Wall (rubble) penetration:
  Low frequency RF signals have better penetration characteristics than higher frequency RF signals. Signal attenuation increases dramatically at higher frequency.
- Resolution:
  Although normally the longer wavelengths of low frequency RF mean degraded resolution of the target, the radar's precise time control of the pulses—to billionths of a second—mitigates this effect.
- Wall materials penetrated:
  Concrete, clay brick, tile, concrete block, sheetrock (wallboard), reinforced concrete, stucco and plaster with 1" wire lath(exterior & interior), wood, composite shingles, fiberglass and fiber insulation. UWB radar shares with all radar the limitations on trying to penetrate sheets of metal and metallic coated materials. Metal doors, aluminum siding, and large objects of metal can block radar signals. This is not an absolute case, however; metal in reinforced concrete may not block UWB radar signals.

Future Development Plan

Time Domain has already tested some solutions to the issues along the RubbleVision development path. These issues and solutions will need to be evaluated with the cooperation of the developers, user community and regulators. A commitment to the urban search and rescue community, with funding and cooperation, can make RubbleVision's development stand on its own and accelerate the arrival of a practical device for UWB radar searches by rescuers.

V2-09/27/01

Time Domain Corporation

Time Domain Corporation, a worldwide leader in the development of Ultra Wideband technology, has developed and patented the potentially breakthrough wireless technology called PulsON. This technology fuses communications, radar and tracking capabilities into a PulsON chipset that delivers significant capabilities for a wide range of products and applications.

Time Domain Corporation • Cummings Research Park • 7057 Old Madison Pike • Huntsville, Alabama 35806
phone 1.256.922.9229 • fax 1.256.922.0387 • www.timedomain.com

Military Benefits

- Robust Operation in Complex Urban Areas
- Precision Location & Tracking
- Spectrum Sharing: Very Low Power Emission
- Noise-Like Signal: LPD & Secure (LPI)
- High Data Rate: Up to 40 Mega bits per second
- High Spatial Capacity: bps per sq. meter
- Fusion: Communications – Location – Sensing
- COTS: Low Cost Product Design, Pure Digital, Software Defined Radio

Government Defense Sector Contracts/Proposals Summary

	Current Contracts	Targeted Proposals
Congressional Plus Ups	$6,150,000	$8,000,000
DARPA NETEX UWB Project		12,000,000
Small Business Innovative Research		
- Phase I	676,753	87,500
- Phase II	2,486,000	378,000
Development and Research	6,720,000	5,941,725
PulsON® Applications Demonstrators	357,350	360,600
	$16,390,103	$26,767,825

Total: $43,157,928

TIME DOMAIN

Government Defense Sector Current Contracts

Current Research & Development Contracts

Congress:	Geotrack Radio Frequency ID/Asset Tracking Tags	$ 3.15m
Congress:	SoldierVision™ Through Wall Radar	3.00m
NIST:	Integrated Communications & Tracking System	3.40m
STRICOM:	Mobile Ad Hoc Networking Comms/PLT Study	1.00m
Navy:	Personal Location/Tracking System on Ship/Overboard	1.45m
NAVAIR:	GPR & Airborne Surveillance Radar	.17m
DARPA:	Self Healing Minefield 3D Positioning System	.20m
NSA:	Ultra Wideband Receivers/Evaluation/Testing	.50m
		$12.87m

TIME DOMAIN

Government Defense Sector Current Contracts

SBIR/STTR Programs	Phase I	Phase II
Over-the-Horizon UAV Comms Link	$120,000	$ 730,000
Radar Terrain Mapping Sensors	33,000	311,000
Optical Conversion for Efficient Blue Lasors	100,000	500,000
Astronaut Multi Channel PLT/Data System	23,000	300,000
OICW Precision Positioning	23,000	220,000
Firefighter Position Location	23,000	150,000
Universal Home Network	33,000	
Interspacecraft Comms	23,000	
Phase Array and SAR Radar Study	21,760	275,000
Shipboard Comms	15,000	
Combat Personal Identification System	21,000	
UGV Comms	100,000	
Pulsed Terawatt Research	99,993	
UWB Through Wall Imaging System	18,000	
UWB Ship Security Perimeter	18,000	
Automated Docking	23,000	
	$676,753	$2,486,000
Total:	$3,162,753	

Company Restricted

Sector Customers-

Government And Defense

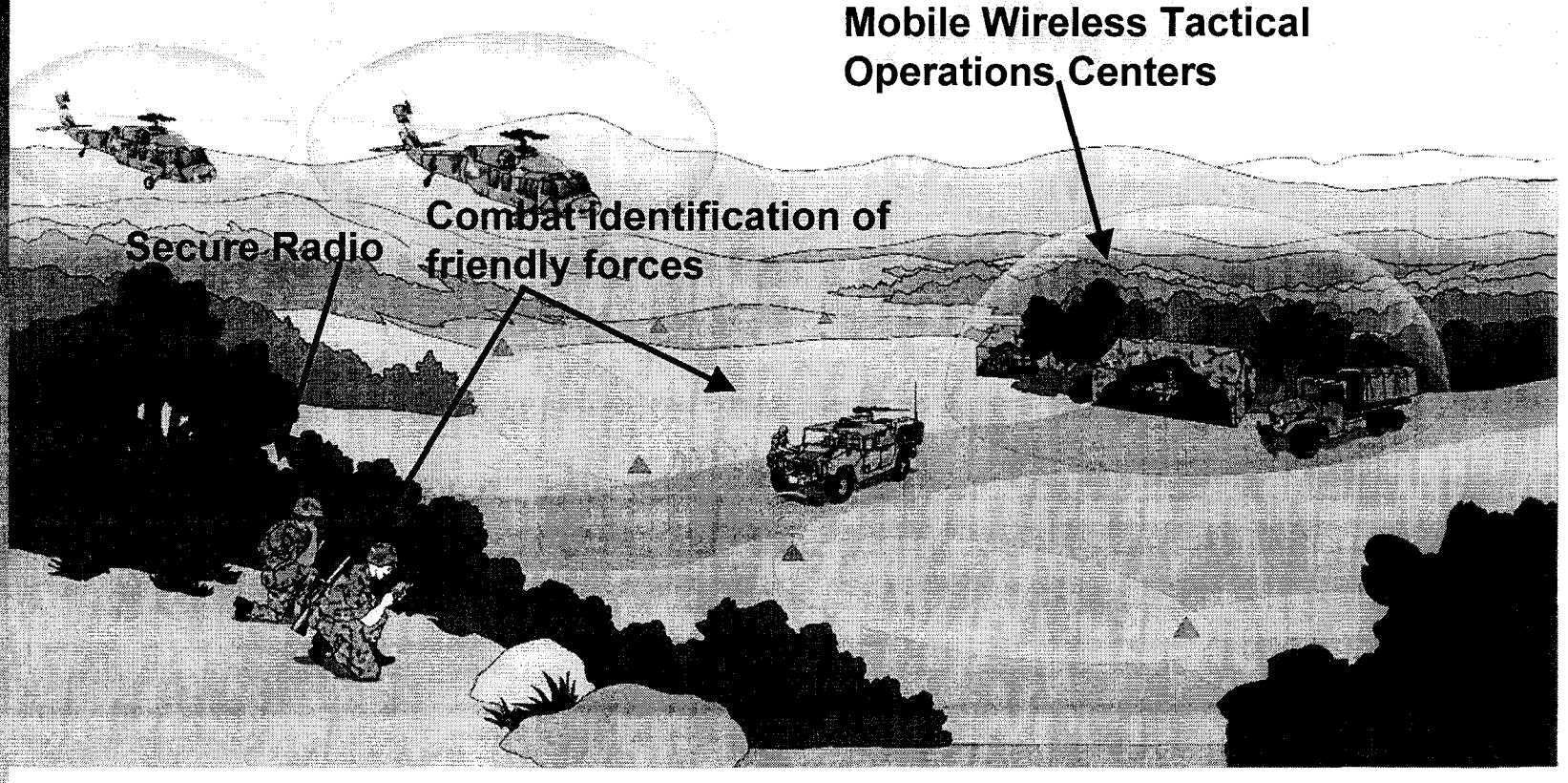
- **Department of Defense**
  - Advanced Concept Technology Demonstration Office, Office of Science and Technology, Defense Advanced Research Projects Agency, Defense Threat Reduction Agency
- **National Security Agency**
- **NASA**
  - Johnson Space Center, Glenn Research Center, Goddard Space Center, Marshall Space Center
- **Department of Commerce**
  - National Institute of Standards and Technology, NTIA
- **National Science Foundation**
- **Air Force Rome Labs**
- **Army**
  - Aviation and Missile Command Advanced Concept Office, Material Command, Simulation and Training Command, Tank Automotive and Armament Command, Land Warrior Program, Space and Missile Defense Command Advance Concept Office, Night Vision and Electronic Sensors Division Lab
- **Navy Department**
  - Naval Air Systems Command, Office of Naval Research, Navy Safety & Survivability Office, Navy Training Command, Navy Automatic Identification Technology Lab
- **Marine Corps**

Company Restricted

Counter-Terrorism/ Consequence Management

- Actively seeking for UWB solutions:
  - ASB, NASA, SMDC, AMCOM, NSA, ONR, TACOM, STRICOM, FEMA, NRL, NTSB, HASC
- Requirements
  - Expedited through-wall radar/motion detector
  - Secure tactical, short range radios (indoor/MOUT)
  - Self-configuring, bi-static radar security "fences"
  - Passive tracking/location tags
  - Active tracking/telemetry tags
  - ~~Through-rubble radar/motion detector~~

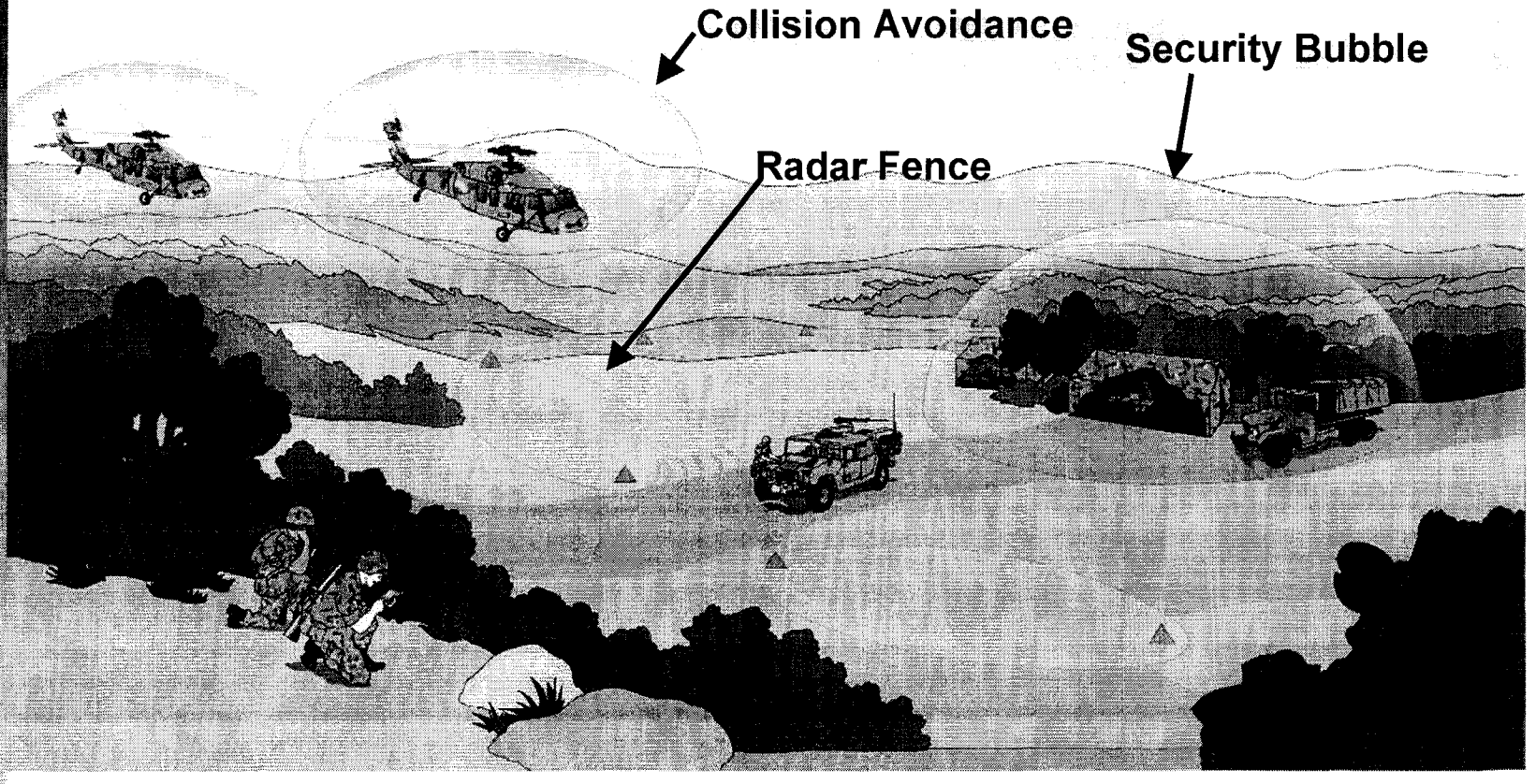
PulsON Applications - Communications



- Radar Applications
- Communications Applications
- Tracking Applications

Company Restricted

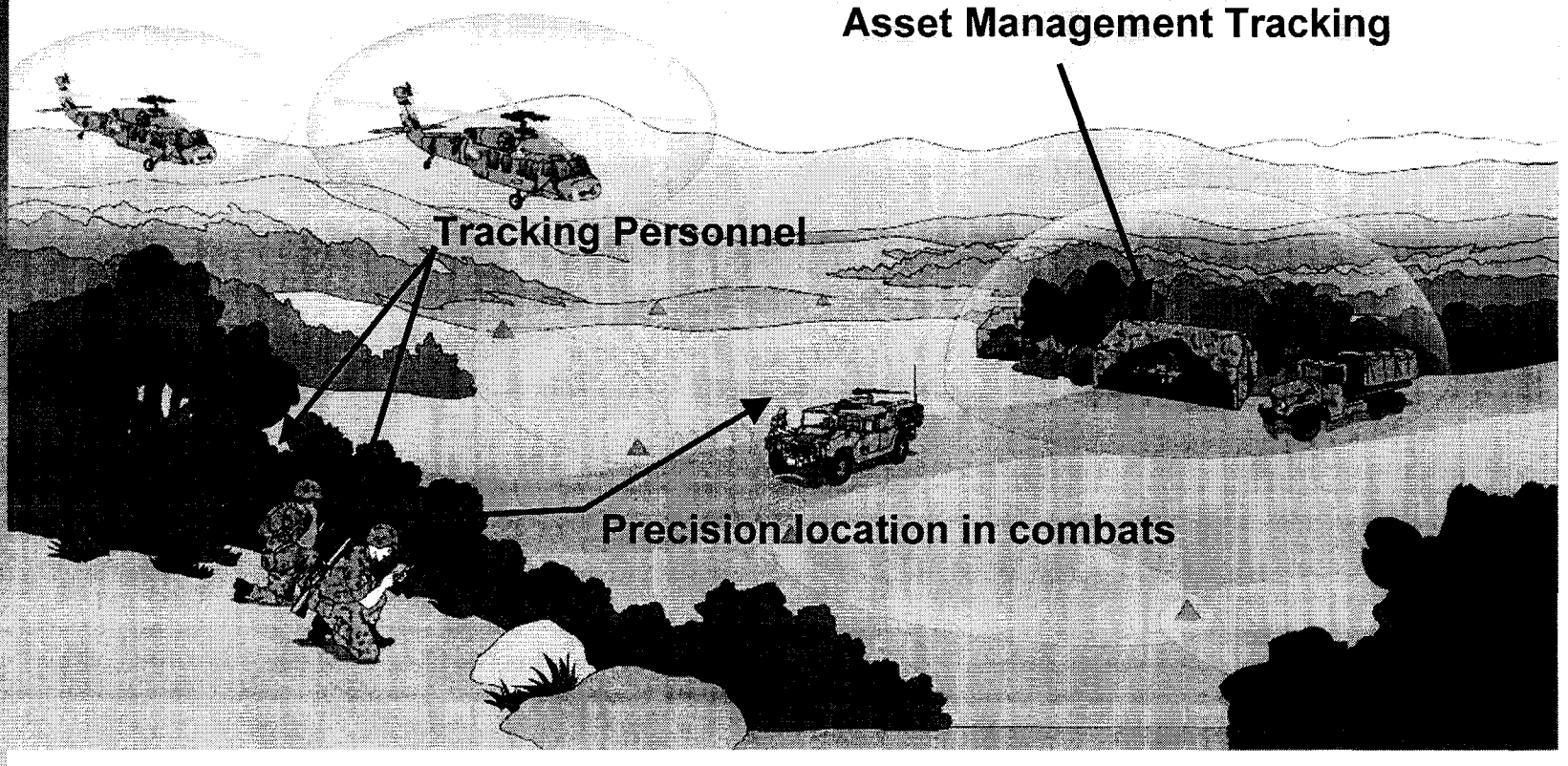
PulsON Applications - Radar



- Radar Applications
- Communications Applications
- Tracking Applications

Company Restricted

PulsON Applications- Tracking



- Radar Applications
- Communications Applications
- Tracking Applications

Company Restricted

Summary/Conclusion

- **Ultrawideband - What's Old Is New Again!**
  - Wireless could have gone straight to UWB if DSP had been available ☺
- **A Cornucopia of Commercial and Military Applications**
  - Communications, radar, geolocation, automation, measurement, etc.
- **UWB Has The Potential for Revolutionary Change**
  - Regulatory changes (FCC Part 15?) are needed
- **UWB Research Has Only Just Begun**
  - Propagation, antennas, circuits, devices, waveforms, signal processing, radio architectures, MAC/network protocols, etc.

Dr. J. A. Freebersyser, Program Manager, DARPA/ATO,
Networking in the Extreme (NETEX) Industry Day Presentation,
September 10, 2001

Company Restricted

Homeland Security Benefits

- Radar Security Fences and Domes
- Tracking Employees for Secure Premises
- Tracking Dangerous Fixed and Mobile Assets
- Tracking For First Responders in Emergencies

Company Restricted

Radar Security

- Invisible zones of security for fixed & mobile assets
- Variable size and configuration
- For operations or temporary billets in high risk areas, radar domes can establish clandestine security zones of varying shape and perimeter distances.
- Low power, low RF signature: LPI/LPD
- Multiple alarm ranges
- Wall penetration capability

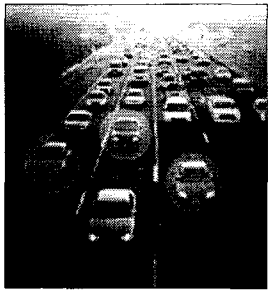
Applications - Radar

Public Safety

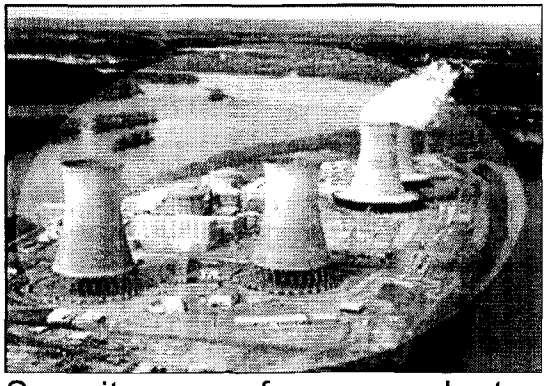
Through wall radar

Through rubble radar

Security



Collision avoidance radar



Security zones for power plants

Tracking Security

- Dangerous Fixed and Mobile Assets
- Employee Tracking for Secure Premises
- Tracking For First Responders in Emergencies
- Critical Asset Management

Applications - Tracking

Public Safety

Secure Premises

Firefighter tracking

Other Markets

Asset location and tracking

Attachment A

DOCUMENT OFF-LINE

This page has been substituted for one of the following:

o An oversize page or document (such as a map) which was too large to be scanned into the ECFS system.

o Microfilm, microform, certain photographs or videotape.

● Other materials which, for one reason or another, could not be scanned into the ECFS system.

The actual document, page(s) or materials may be reviewed by contacting an Information Technician at the FCC Reference Information Center, at 445 12th Street, SW, Washington, DC, Room CY-A257. Please note the applicable docket or rulemaking number, document type and any other relevant information about the document in order to ensure speedy retrieval by the Information Technician.

One CD